

Ag Power Technology

18402

Rationale Statement:

Technically trained employees are needed in many aspects of the agriculture power industry. Mechanic shops, implement dealers and outdoor power sports are examples of careers where technical skills in Ag Power Technology are needed. Demand for jobs in the area of ag power technology such as diesel mechanic, electrician and tractor mechanic are expected to remain steady to slightly increasing. The course addresses the technical and industrial issues related to Power, Structural & Technical Systems within South Dakota. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Mathematics, science, English and human relations skills will be reinforced throughout the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competition such as the Ag Mechanics Career Development Event or related proficiency award areas. Each student will be expected to complete a Supervised Agricultural Experience program/Internship.

Suggested grade level: 9th – 12th

Topics covered:

- Basic engines principles
- Power trains
- Hydraulics
- Fuels
- Electrical systems
- Detailed maintenance
- Troubleshooting and repair of agricultural equipment systems and components
- Operation, maintenance, and repair of small gasoline, diesel engines, and electric motors
- Principles of operation of gasoline and diesel engines
- Tune-up and maintenance procedures
- Disassembly, overhaul, and reassembly
- Operation of two cycle and four-cycle engines

Indicator #1: Apply physical science principles to engineering with mechanical equipment, power utilization and technology.

Bloom's Taxonomy Level	Standard and Examples
Analyzing	<p>APT 1.1 Compare power generation to energy sources.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Classify petroleum sources used in vehicles. • Discuss alternative sources of fuels. • Compare environmental impact of energy sources for pollution. • Compare efficiency of energy source in miles per gallon (MPG). • Compare characteristics of energy sources.
Applying	<p>APT 1.2 Apply principles of lubricants to sort and classify lubricants.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Classify lubricants and determine applications for vehicles and machinery. • Demonstrate viscosity and strengths of lubricants. • Demonstrate properties of lubricants.

Indicator #2: Apply principles of operation and maintenance to mechanical equipment, power utilization, and technology.

Bloom's Taxonomy Level	Standard and Examples
Applying	<p>APT 2.1 Perform scheduled service routines to maintain machinery and equipment.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Lubricate machinery and equipment to specifications. • Service electrical systems. • Maintain proper fluid levels to system specifications. • Create a routine preventive maintenance schedule and follow. • Illustrate causes of malfunctions and failures by using a diagnostics flowchart.

Applying	<p>APT 2.2 Observe the rules of the road to operate machinery and equipment.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Safely operate machine controls and instrumentation. • Perform appropriate start-up procedures using a checklist. • Perform pre-operation inspection according to specifications. • Illustrate applicable laws for on- and off-highway operation.
<p>Indicator #3: Examine principles of service and repair to mechanical and electrical equipment, power utilization and technology.</p>	
Bloom's Taxonomy Level	Standard and Examples
Analyzing	<p>APT 3.1 Evaluate performance to service and repair the components of internal combustion engines.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Illustrate principles of operation by drawing the cycles. • Distinguish engine systems and components using a diagram. • Troubleshoot engine problems using a diagnostics chart. • Differentiate overhaul procedures to specifications. • Analyze engine performance through post-rebuild testing.
Applying	<p>APT 3.2 Interpret manufacturers' guidelines to service and repair power transmission systems.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Interpret features, benefits and applications of various power transmission systems. • Interpret principles of operation of various power transmission systems. • Perform calculations involving speed, torque and power relationships. • Inspect transmission systems.

Applying	<p>APT 3.3 Service hydraulic systems.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Interpret features, benefits and applications of types of hydraulic systems. • Diagram physical principle of operation by creating a drawing. • Interpret symbols and schematic drawings according to diagnostic keys. • Illustrate the application and operation of major components. • Inspect hydraulic components to specifications.
Applying	<p>APT 3.4 Service vehicle electrical systems.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Interpret features and applications of electrical systems. • Interpret symbols and wiring diagrams and fix problems. • Troubleshoot electrical systems and components. • Troubleshoot and install instrumentation and data acquisition system. • Diagnose and repair control systems and sensors.
Applying	<p>APT 3.5 Use company diagrams and schematics to service vehicle heating and air conditioning systems.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Describe physical principles of operation. • Interpret symbols and diagrams according to diagnostic keys. • Troubleshoot heating and air-conditioning components according to specifications.
Evaluating	<p>APT 3.6 Evaluate performance parameters to service and repair steering, suspension, traction and vehicle performance systems.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Evaluate traction, ballasting and weight transfer. • Evaluate vehicle stability for safety. • Compare optimum vehicle performance. • Appraise suspension systems. • Compare steering systems to specifications.

Applying	<p>APT 3.7 Diagnose problems associated with small gas engines.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Measure engine parts with micrometer, plastigage and calipers. • Illustrate the principles of a 2 and 4 cycle engine by modeling. • Identify engine parts and functions. • Repair engine parts. • Adjust engine parts.
Applying	<p>APT 3.8 Diagnose problems associated with tractors.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Interpret operator's manual. • Design a maintenance schedule. • Illustrate engine parts and functions. • Service tractor parts.
Applying	<p>APT 3.9 Illustrate various electric motor types, operation and maintenance.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Calculate problems using Ohm's laws. • Demonstrate the use of a voltmeter, ohmmeter and amp meter. • Interpret information on electric motor nameplate. • Appraise motor type and size for appropriate work load. • Reverse rotation on an electric motor.